

## PATENT ABSTRACTS OF JAPAN

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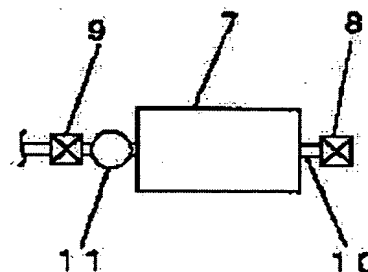
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### (54) FUEL CELL POWER GENERATING SYSTEM

#### (57)Abstract:

**PURPOSE:** To confirm fuel leak by supplying fuel from a fuel path with an end stop valve arranged downstream of a fuel cell closed and informing the pressure value of the fuel in the fuel cell when a main stop valve is closed.

**CONSTITUTION:** An end stop valve 8 arranged downstream of a fuel cell 7 and a main stop valve 9 arranged upstream are connected through a fuel path 10, and a pressure informing device 11 is set in the fuel path 10. When fuel gas is supplied from a fuel supply source with the end stop valve 8 closed and the main stop valve 9 opened, the fuel gas becomes full in the fuel cell 7 and the fuel path 10. When the main stop valve 9 is closed, the fuel gas is sealed in the fuel cell 7 and the fuel path 10, and the sealed gas pressure is detected with the pressure informing device 11. When the fuel gas does not leak from the fuel cell 7, the sealed gas pressure is kept constant, but when the fuel gas leaks, the sealed gas pressure gradually lowers with time elapsed.



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CLAIMS

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[Claim(s)]

[Claim 1] The fuel cell generation-of-electrical-energy system equipped with the fuel cell, the former stop valve prepared in the upper section of said fuel cell, the point stop valve prepared in the downstream of said fuel cell, and a pressure information means to detect and report the pressure in the condition that said both valves closed.

[Claim 2] The fuel cell generation-of-electrical-energy system according to claim 1 which equipped the entrance side of a former stop valve with the inert gas source of supply which supplies inert gas.

[Claim 3] The fuel cell generation-of-electrical-energy system [ equipped with the pressure relief valve wide opened by the predetermined pressure as a point stop valve ] according to claim 1.

[Claim 4] The fuel cell generation-of-electrical-energy system [ equipped with a radio means to transmit the pressure information acquired with the pressure information means ] according to claim 1.

[Claim 5] The fuel cell generation-of-electrical-energy system [ equipped with a timer means to operate a radio means with a predetermined time interval ] according to claim 4.

[Claim 6] The fuel cell generation-of-electrical-energy system [ equipped with a display means to display indoors the pressure information transmitted by the radio means ] according to claim 4.

[Claim 7] The fuel cell generation-of-electrical-energy system [ equipped with a storage means to accumulate the time series data of the pressure information transmitted by the radio means ] according to claim 4.

[Claim 8] The fuel cell generation-of-electrical-energy system [ equipped with a time series display means to display the time series data of the pressure information accumulated in the storage means ] according to claim 7.

[Claim 9] The fuel cell generation-of-electrical-energy system according to claim 7 which it had the operation means which carries out data processing of the time series data of the pressure information accumulated in a storage means, a judgment means judge the abnormalities of a fuel in leakage based on the pressure value and the reference value which were acquired with said operation means, and an information means it is based on the result of said judgment means, and display and notify the condition at the time of the need, and said operation means, said judgment means, and said information means were really constituted, and was installed indoors.

[Claim 10] The fuel cell generation-of-electrical-energy system [ equipped with the terminal circuit means connected to the external public line ] according to claim 9 by which the information means was connected with said terminal circuit means.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention detects leakage of the fuel from a fuel cell before a start up, and relates to the fuel cell generation-of-electrical-energy system which aimed at improvement in safety.

[0002]

[Description of the Prior Art] Conventionally, there was a thing of the configuration of JP,4-220955,A shown in drawing 4 as this kind of a fuel cell. As shown in drawing, the body 1 of a fuel cell is contained by the container 2, the inert gas supply line by which 3 supplies inert gas, such as nitrogen gas, from an end in a container 2, and 4 are covers which surround the body 1 of a fuel cell, free passage connection of the upper part is made in inert gas emission Rhine 5, and the gas concentration detector 6 is formed. Fuel gas, such as hydrogen revealed in the container 2 from the interior of the body 1 of a fuel cell, is covered, and a collection is carried out by 4, and it is detected in the gas concentration detector 6.

[0003]

[Problem(s) to be Solved by the Invention] However, the equipment for make always full inert gas, such as the container 2 which surround the body 1 of a fuel cell, and nitrogen, be required, when the whole system be generated in a miniaturization by the defect of \*\*\*\* and the gas concentration detection 7, or the gas leakage below detection precision, inflammable gas be filled with the above-mentioned conventional configuration in the container 2, and with it, the technical problem that it resulted in a very dangerous condition occurred.

[0004] This invention solves the above-mentioned conventional technical problem, and it is small and aims at the thing which can moreover supervise leakage of a fuel daily and for which a reliable fuel cell generation-of-electrical-energy system is offered beforehand which starts a generating mode.

[0005]

[Means for Solving the Problem] This invention consists of the following configurations, in order to solve the above-mentioned technical problem. That is, it is considering as the configuration equipped with the fuel cell, the former stop valve prepared in the upper section of said fuel cell, the point stop valve prepared in the downstream of said fuel cell, and a pressure information means to detect and report the pressure in the condition that said both valves closed.

[0006] Moreover, it is considering as the configuration which equipped the entrance side of a former stop valve with the inert gas source of supply which supplies inert gas as the 2nd configuration.

[0007] Moreover, it is considering as the configuration equipped with the pressure relief valve wide opened by the predetermined pressure as a point stop valve as the 3rd configuration.

[0008] Moreover, it is considering as the configuration equipped with a radio means to transmit the pressure information acquired with the pressure information means as the 4th configuration.

[0009] Moreover, it is considering as the configuration equipped with a timer means to operate a radio means with a predetermined time interval, as the 5th configuration.

[0010] Moreover, it is considering as the configuration equipped with a display means to display indoors

the pressure information transmitted by the radio means as the 6th configuration.

[0011] Moreover, it is considering as the configuration equipped with a storage means to accumulate the time series data of the pressure information transmitted by the radio means as the 7th configuration.

[0012] Moreover, it is considering as the configuration equipped with a time series display means to display the time series data of the pressure information accumulated in the storage means as the 8th configuration.

[0013] Moreover, the operation means which carries out data processing of the time series data of the pressure information accumulated in the storage means as the 9th configuration, A judgment means to judge the abnormalities in leakage of a fuel based on the pressure value and reference value which were acquired with said operation means, It is based on the result of said judgment means, has an information means to display and notify the condition at the time of the need, and is considering as the configuration in which said operation means, said judgment means, and said information means were really constituted, and were installed indoors.

[0014] Moreover, as the 10th configuration, it has the terminal circuit means connected to the external public line, and the information means is considering as the configuration connected with said terminal circuit means.

[0015]

[Function] The fuel cell generation-of-electrical-energy system of this invention achieves the following operations by the above-mentioned configuration. That is, if the closedown of the former stop valve prepared in the upper section of a fuel cell is carried out after the closedown of the point stop valve prepared in the downstream of a fuel cell has been carried out by the configuration equipped with a pressure information means detect and report the charged pressure in the condition that a former stop valve and a point stop valve, and both valves closed and a fuel is supplied, it will be in the condition that the fuel was enclosed in the fuel cell, and the charged-pressure value will be reported by the pressure information means. Since a pressure value falls gradually with time amount progress when the fuel is revealed from the fuel cell, leakage can be checked with a pressure information means.

[0016] Moreover, it will be in the condition that inert gas was enclosed in the fuel cell through the former stop valve by the configuration which equipped the entrance side of a former stop valve of the 2nd configuration with the inert gas source of supply which supplies inert gas, the charged pressure value is detected by the pressure information means, and leakage can be checked from a pressure drop. Also when leakage has occurred, inert gas leaks to a perimeter, and it is [ no risk of ignition explosion ] and is safe.

[0017] Moreover, when the pressure of the fuel enclosed with a fuel cell is more than a predetermined pressure, after a point stop valve will be in an open condition and charged pressure declines to a predetermined pressure by the configuration equipped with the pressure relief valve wide opened by the predetermined pressure as a point stop valve of the 3rd configuration, since a closedown is carried out, charged pressure can be set as a predetermined pressure, and breakage of a fuel cell can be prevented.

[0018] Moreover, when the pressure variation of the fuel enclosed with the fuel cell is detected by the configuration equipped with a radio means to transmit the pressure information acquired with the pressure information means of the 4th configuration, with a pressure information means and leakage occurs in a fuel cell by it, the detection pressure force declines, and the pressure information according to a leak rate is transmitted from a radio means. Therefore, leakage generating can be checked daily in the distant locations, such as indoor.

[0019] Moreover, the power consumed by the configuration equipped with a timer means to operate the radio means of the 5th configuration with a predetermined time interval in case it transmits from a radio means can be held down to necessary minimum.

[0020] Moreover, since the pressure information on the fuel enclosed with the fuel cell by the configuration equipped with a display means to display indoors the pressure information transmitted by the radio means of the 6th configuration is indoors displayed by the radio means, before an indoor user starts operation of a fuel cell, leakage of the fuel from a fuel cell can be recognized.

[0021] moreover, the pressure information on the charged pressure detected by superannuation of a fuel

cell before a start up by the configuration equipped with a storage means to accumulate the time series data of the pressure information transmitted by the radio means of the 7th configuration also when leakage advances gradually -- each time -- a storage means -- accumulating -- having -- since -- leakage -- the situation of secular change is detectable.

[0022] Moreover, an indoor user can recognize the situation of secular change of the leakage from a fuel cell before initiation of a generating mode by the configuration equipped with a time series display means to display the time series data of the pressure information accumulated in the storage means of the 8th configuration.

[0023] Moreover, the operation means which carries out data processing of the time series data of the pressure information accumulated in the storage means of the 9th configuration, A judgment means to judge the abnormalities in leakage of a fuel based on the pressure value and reference value which were acquired with said operation means, By the configuration which it was based on the result of said judgment means, and had an information means to display and notify the condition at the time of the need, and said operation means, said judgment means, and said information means were really constituted, and was installed indoors poor assembly, superannuation, etc. of a fuel cell -- the fall inclination of the charged pressure before a start up -- \*\*, also when going on gradually Pressure information is accumulated in a storage means as time series data. before a start up -- each time -- detecting -- having -- charged pressure -- A future present or leakage value is computed by the operation means, a comparison test is carried out to a reference value by the judgment means, and an indoor user can be made to recognize a leakage situation with an information means based on the result.

[0024] Moreover, it can have the terminal circuit means connected to the external public line of the 10th configuration, and leakage information can be transmitted to the service firm of the exterior where the information means was connected with the terminal circuit means through the public line by the configuration connected with said terminal circuit means etc. timely.

[0025]

[Example] The example of this invention is explained with reference to a drawing below.

[0026] Drawing 1 is the fuel cell generation-of-electrical-energy structure-of-a-system Fig. of the 1st example of this invention. In drawing 1, free passage connection of the former stop valve 9 prepared in the point stop valve 8 and upper \*\*\*\* which were prepared in the downstream of a fuel cell 7 is made in the fuel path 10, and the pressure information means 11 is formed in the fuel path 10.

[0027] In the above-mentioned configuration, where the closing former stop valve 9 is opened, if fuel gas is supplied from a fuel source (not shown), fuel gas will be [ stop valve / 8 / point ] full of a fuel cell 7 and the fuel path 10. If the after that former stop valve 9 is closed, it will be in the condition that fuel gas was enclosed with the fuel cell 7 and the fuel path 10, and the charged pressure will be detected by the pressure information means 11. When fuel gas is not revealed from a fuel cell 7, charged pressure maintains constant value, but when fuel gas is revealed, since charged pressure declines gradually with time amount progress, leakage can be checked with the pressure information means 11.

[0028] Drawing 2 is the fuel cell generation-of-electrical-energy structure-of-a-system Fig. of the 2nd example of this invention, the thing of drawing 1 and a same sign is a corresponding component, and detailed explanation is omitted. In drawing, 12 is the inert gas source of supply connected to the entrance side of the former stop valve 9, and the pressure relief valve 13 is formed in the down-stream edge of the fuel path 10.

[0029] In the above-mentioned configuration, if inert gas is supplied from the inert gas source of supply 12, a fuel cell 7 and the fuel path 10 will be filled with inert gas. If a pressure relief valve 13 is closed after that, it will be in the condition that inert gas was enclosed with the fuel cell 7 and the fuel path 10, and the charged pressure will be detected by the pressure information means 11. When inert gas is revealed, since charged pressure declines gradually with time amount progress, leakage can be detected with the pressure information means 11. Also when leakage has occurred, inert gas leaks to a perimeter, and it is [ no risk of ignition explosion ] and is safe. Moreover, when the pressure of the fuel enclosed with a fuel cell is more than a predetermined pressure, after a pressure relief valve 13 will be in an open condition and charged pressure declines to a predetermined pressure, since a closedown is carried out

again, charged pressure can be set as a predetermined pressure, and breakage of a fuel cell can be prevented.

[0030] Drawing 3 is the fuel cell generation-of-electrical-energy structure-of-a-system Fig. of the 3rd example of this invention, the thing of drawing 1 and drawing 2, and a same sign is a corresponding component, and detailed explanation is omitted. In drawing, the fuel cell 7 is installed in the outdoors, valve mechanical-component 8a and valve mechanical-component 9a are attached in each of the point stop valve 8 and the former stop valve 9, and each valve mechanical component is connected with the valve-control section 14. The radio means 15 is connected with the timer means 16 and the cell section 17 for connecting with the pressure information means 11. Indoors the display means 18 and the storage means 19 of receiving the signal from the radio means 15 are established, and the time series display means 20 is connected to the storage means 19. 21 is an operation means which carries out data processing of the time series data of the storage means 19, 22 is a judgment means to judge the result of the operation means 21, and 23 is an information means to report based on the result of the judgment means 22. The information means 23 is connected to the service firm 26 through the public line 25 through the terminal circuit means 24.

[0031] In the above-mentioned configuration, before the point stop valve 8 and the former stop valve 9 perform the switching action of a valve and start a generating mode by the control signal machine \*\*\*\*\* mechanical components 8a and 9a from the valve-control section 14, fuel gas is enclosed with the fuel path 10. The detection output obtained with the pressure information means 11 is indoors transmitted by the radio means 15 with the predetermined time interval set up with the timer means 16, and power required for a communication link is supplied from the cell section 17. Therefore, when leakage occurs in a fuel cell 7, the detection pressure force declines, it is transmitted from the radio means 15 and the pressure information according to a leak rate can detect leakage generating daily in the distant locations, such as indoor. Moreover, since the timer means 16 is operated with a predetermined time interval and it transmits from the radio means 15, when can hold down the power consumed in the case of transmission to necessary minimum, the cell section 17 is made to prolonged exchange needlessness, a part of generation-of-electrical-energy output of a fuel cell 7 is made to store electricity and it considers as the power source for a communication link, the amount of generations of electrical energy which can be used can be made to increase. the detection output transmitted indoors -- each time -- the display means 18 -- a digital readout -- since it is carried out, before an indoor user starts operation of a fuel cell 7, leakage of the fuel from a fuel cell 7 can be recognized. Moreover, since the charged pressure value acquired before a start up is accumulated in the storage means 19 as time series data, also when leakage advances gradually according to superannuation of a fuel cell 7, the situation of secular change of leakage can be detected exactly. Moreover, since the digital readout of the detection output for every day is carried out to the time series display means 20, an indoor user can recognize and judge the situation of secular change of leakage before initiation of a generating mode. Moreover, since data processing of the time series data accumulated in the storage means 19 is carried out with the operation means 21, the result is judged with the judgment means 22 and it is reported by the information means 23 based on a judgment result, an indoor user can be made to recognize a leakage situation objective excluding the individual decision difference by the user. Moreover, since it connects with the external service firm 26 through the public line 25, the terminal circuit means 24 connected to the information means 23 can provide the service firm 26 with the leakage information from the information means 23 timely, and even if a user is not conscious, it can carry out maintenance check of a fuel cell 7 effectively.

[0032]

[Effect of the Invention] It has the effectiveness which the fuel cell generation-of-electrical-energy system of this invention describes below explained above.

[0033] That is, if the closedown of the former stop valve is carried out after the closedown of the point stop valve arranged in the downstream of a fuel cell has been carried out by the 1st configuration equipped with a pressure information means detect and report the charged pressure in the condition that a former stop valve and a point stop valve, and both valves closed and a fuel is supplied from a fuel

path, it will be in the condition that the fuel was enclosed in the fuel cell, and the pressure value detects and will be reported by the pressure information means. Since a pressure value falls gradually when the fuel is revealed from the fuel cell, by the easy configuration which consists of two shut-off valves and pressure information means, leakage can be checked and a system can be miniaturized. Since leakage is detectable before starting a generating mode, it is safe, and since only the fuel within a fuel path is emitted even if leakage occurs, it is very little and safe.

[0034] Moreover, inert gas is enclosed in a fuel cell, and the pressure value is detected with a pressure information means by the 2nd configuration which equipped the entrance side of a former stop valve with the inert gas source of supply which supplies inert gas, and can detect leakage from a pressure drop by it. Also when leakage has occurred, inert gas is revealed to a perimeter, and it is [ no risk of ignition explosion ] and is safe.

[0035] Moreover, by the 3rd configuration equipped with the pressure relief valve wide opened by the predetermined pressure as a point stop valve, since a point stop valve will be in an open condition when the pressure of the fuel enclosed with a fuel cell is more than a predetermined pressure, also when charged pressure can be set as a predetermined pressure and charged pressure becomes high pressure unusually, high pressure does not arise in a fuel cell and breakage can be prevented.

[0036] Moreover, when the pressure of the fuel enclosed with a fuel cell is detected with a pressure information means by the 4th configuration equipped with a radio means to transmit the pressure information acquired with the pressure information means and leakage occurs in a fuel cell by it, the detection pressure force declines, and the pressure information according to a leak rate is transmitted from a radio means. Therefore, leakage generating can be daily checked without construction of a signal line etc. in the distant locations, such as indoor.

[0037] Moreover, when the power consumed in case it transmits from a radio means can be held down to necessary minimum, the generation-of-electrical-energy output of a fuel cell is stored electricity by the 5th configuration equipped with a timer means to operate a radio means with a predetermined time interval and it uses, the available amount of generations of electrical energy can be made to increase.

[0038] since the pressure information on the fuel enclosed with the fuel cell by the 6th configuration equipped with a display means display indoors the pressure information transmitted by the radio means is indoors displayed by the radio means, before [ moreover, ] an indoor user starts operation of a fuel cell -- each time -- the fuel from a fuel cell -- leakage can be recognized and safety can improve so more to leakage.

[0039] moreover, the case where leakage advances gradually according to superannuation of a fuel cell by the 7th configuration equipped with a storage means to accumulate the time series data of the pressure information transmitted by the radio means -- before a start up -- each time -- detecting -- having -- charged pressure -- since pressure information is accumulated in a storage means, the situation of secular change of leakage is exactly detectable.

[0040] Moreover, by the 8th configuration equipped with a time series display means to display the time series data of the pressure information accumulated in the storage means, an indoor user can recognize and judge the situation of secular change of the leakage from a fuel cell before initiation of a generating mode.

[0041] By moreover, the 9th configuration in which the operation means and the judgment means of judging the abnormalities in leakage of a fuel from the pressure value acquired by carrying out data processing of the time series data of pressure information, and notifying the condition based on the result at the time of the need, and the information means were really constituted, and were installed indoors Also when extent of the pressure drop of an enclosure fuel advances gradually according to poor assembly, superannuation, etc. of a fuel cell The pressure information on the charged pressure detected before a start up is accumulated in a storage means as capital degree hour sequence data. Since a future present or leakage value is computed by the operation means, a comparison test is carried out to a reference value by the judgment means and an information means can report a leakage situation to an indoor user based on the result, a leakage situation can be made to recognize objective excluding individual difference.



[0042] Moreover, it can have the terminal circuit means connected to the external public line, and leakage information can be transmitted to the service firm of the exterior where the information means was connected with the terminal circuit means through the public line by the 10th configuration connected with said terminal circuit means etc. timely, and even if a user is not conscious, a service firm can carry out maintenance check of a fuel cell effectively.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The fuel cell generation-of-electrical-energy structure-of-a-system Fig. in the 1st example of this invention

[Drawing 2] The fuel cell generation-of-electrical-energy structure-of-a-system Fig. in the 2nd example of this invention

[Drawing 3] The fuel cell generation-of-electrical-energy structure-of-a-system Fig. in the 3rd example of this invention

[Drawing 4] The block diagram of the gas leak detector from the conventional fuel cell

[Description of Notations]

7 Fuel Cell

8 Point Stop Valve

9 Former Stop Valve

11 Pressure Information Means

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[Translation done.]

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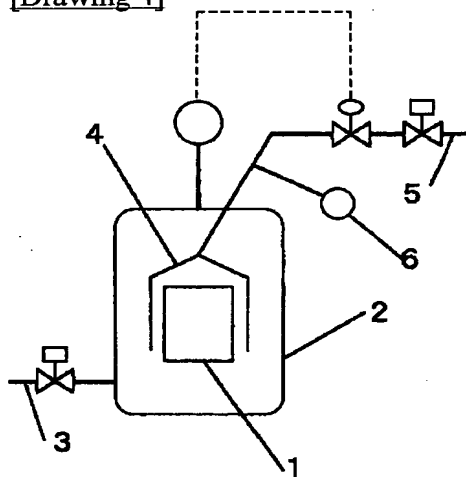
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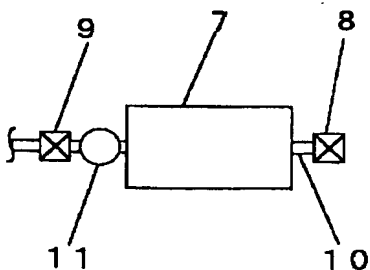
## DRAWINGS

[Drawing 4]



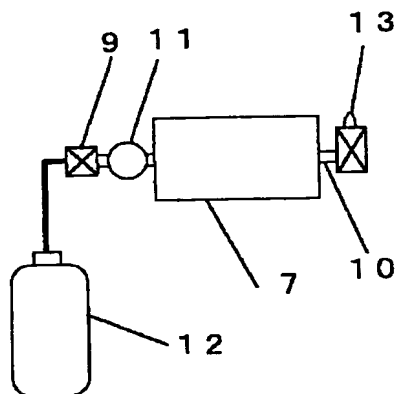
[Drawing 1]

- 7 燃料電池
- 8 先止め弁
- 9 元止め弁
- 1 1 圧力報知手段



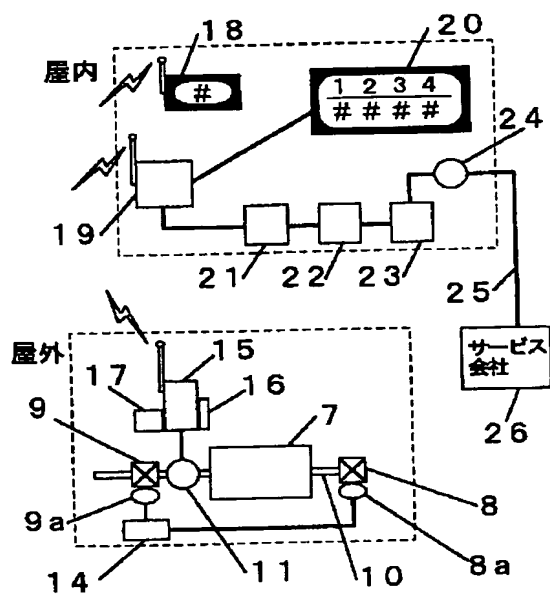
[Drawing 2]

- 12 不活性ガス  
供給源  
13 圧力逃がし弁



[Drawing 3]

- 15 無線通信手段 21 演算手段  
16 タイマー手段 22 判定手段  
18 表示手段 23 報知手段  
19 記憶手段  
20 時系列表示手段  
24 ターミナル回線手段



[Translation done.]

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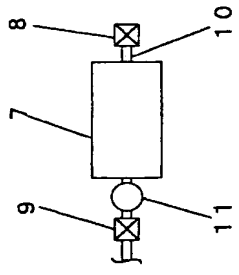
(21) 出願番号 特願平7-130087	(22) 出願日 平成7年(1995)5月29日	(71) 出願人 000005821 松下電器産業株式会社 大阪府門真市大字門真1006番地 麻生 智徳	(72) 発明者 大阪府門真市大字門真1006番地 松下電器 産業株式会社内 近藤 龍太	(73) 発明者 大阪府門真市大字門真1006番地 松下電器 産業株式会社内 井別士 満本 智之 (外名)
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(54) 【発明の名称】 燃料電池発電システム

(57) 【要約】

【目的】 燃料電池の燃料漏洩検知による安全性の向上。

【構成】 燃料電池7の上流部と下流部に各々元止め弁9と先止め弁8を設け、発電運転開始前に燃料ガスを封入し、その圧力変化を圧力検知手段11で検知し、漏洩の発生を封入圧力の低下から検知する。



- 7 燃料電池
- 8 先止め弁
- 9 元止め弁
- 11 圧力検知手段

【特許請求の範囲】

【請求項1】 燃料電池と、前記燃料電池の上流部に設けられた元止め弁と、前記燃料電池の下流部に設けられた先止め弁と、前記両弁が開じた状態で前記燃料電池の圧力検知手段と、前記燃料電池の下流部に設けられた圧力検知手段とを備えた燃料電池発電システム。

【請求項2】 元止め弁の入口側に不活性ガスを供給する不活性ガス供給源を備えた請求項1記載の燃料電池発電システム。

【請求項3】 先止め弁として所定圧力で開放される圧力検知手段を備えた請求項1記載の燃料電池発電システム。

【請求項4】 圧力検知手段で得られた圧力情報を送信するタイマー手段を備えた請求項1記載の燃料電池発電システム。

【請求項5】 無線通信手段を前記時間間隔で動作させるタイマー手段を備えた請求項4記載の燃料電池発電システム。

【請求項6】 無線通信手段によって送信された圧力情報を室内に表示する表示手段を備えた請求項4記載の燃料電池発電システム。

【請求項7】 無線通信手段によって送信された圧力情報に基づき燃料の漏洩異常を判定する圧力検知手段と、前記圧力検知手段の結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項8】 記憶手段に蓄積された圧力情報の時系列データを表示する時系列表示手段を備えた請求項7記載の燃料電池発電システム。

【請求項9】 記憶手段に蓄積された圧力情報の時系列データを演算処理する演算手段と、前記演算手段で得られた圧力値及び基準値に基づき燃料の漏洩異常を判定する判定手段と、前記判定手段の結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項10】 外部の公衆回線に接続されたターミナル回線手段を備え、前記回線手段が前記ターミナル回線手段と前記圧力検知手段とを介して圧力検知手段と前記圧力検知手段とを接続する接続手段を備えた請求項9記載の燃料電池発電システム。

【請求項11】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項12】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項13】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項14】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項15】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項16】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項17】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項18】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項19】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項20】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項21】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項22】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項23】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項24】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項25】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項26】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項27】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項28】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項29】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項30】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項31】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項32】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項33】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項34】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項35】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項36】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項37】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

【請求項38】 前記圧力検知手段の検出結果に基づき、必要時にその判定結果を、無線通信手段を介して送信する送信手段とを備えた請求項4記載の燃料電池発電システム。

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【0014】また第10の構成としては、外部の公衆回線に接続されたターミナル回路手段を備え、報知手段が前記ターミナル回路手段と接続された構成としている。

【0015】

【作用】上記構成により本発明の燃料電池発電システムは以下の作用を具す。すなわち、元止め弁及び先止め弁と、両弁が閉じた状態での封入圧力を検知し報知する圧力報知手段を備えた構成により、燃料電池の下流部に設けられた先止め弁が閉じた状態では燃料が供給され、燃料電池の上流部に設けられた元止め弁が閉じた状態では燃料が供給され、燃料電池内に燃料が封入された状態となり、その封入圧力が燃料が圧力報知手段によって報知される。燃料電池から燃料が漏洩している際には圧力値が時間経過とともに徐々に低下するので圧力報知手段によって漏洩を確認できる。

【0016】また第2の構成、元止め弁の入口側に不活性ガスを供給する不活性ガス供給源を備えた構成により、元止め弁を経て燃料電池内に不活性ガスが封入された状態となり、その封入圧力が燃料が圧力報知手段によって報知される。燃料電池から燃料が漏洩している際には圧力値が時間経過とともに徐々に低下するので圧力報知手段によって漏洩を確認できる。

【0017】また第3の構成、先止め弁として所定圧力で開放される圧力弁を備えた構成により、燃料電池へ封入される燃料の圧力が所定圧力以上である場合には、先止め弁が開放状態となり所定圧力まで封入圧力が低下した後、閉止するので封入圧力を所定圧力に設定することができ、燃料電池の漏洩を防止できる。

【0018】また第4の構成、圧力報知手段で得られた圧力情報を送信する無線通信手段を備えた構成により、燃料電池に封入された燃料の圧力変化が圧力報知手段で検知され、燃料電池に漏洩が発生した際には検出圧力が低下し、漏洩に応じた圧力情報が無線通信手段から送信される。従って屋内などの離れた場所から日常的に漏洩発生を確認できる。

【0019】また第5の構成、無線通信手段を所定の時間間隔で動作させるタイマー手段を備えた構成により、無線通信手段から送信する際に消費される電力を必要最小限に抑えることができる。

【0020】また第6の構成、無線通信手段によって送信された圧力情報を屋内に表示する手段を備えた構成により、燃料電池に封入された燃料の圧力情報が無線通信手段によって屋内に表示されるので、屋内の利用者が燃料電池の運転を開始する前に、燃料電池からの燃料の漏洩を確認することができる。

【0021】また第7の構成、無線通信手段によって送信された圧力情報の時系列データを蓄積する記憶手段を備えた構成により、燃料電池の老朽化によって漏洩が徐々に進行する場合にも、運転開始前に検知される封入圧力の圧力情報が漏洩記憶手段に蓄積されるので、漏洩

端に認められている。

【0029】上記構成において、不活性ガス供給源12から不活性ガスが供給されると、燃料電池7及び燃料経路10に不活性ガスが充填する。その後圧力値が13を閉じると、燃料電池7及び燃料経路10に不活性ガスが封入された状態となり、その封入圧力が圧力報知手段11によって検知される。不活性ガスが漏洩している場合には、封入圧力が時間経過とともに徐々に低下するので圧力報知手段11によって漏洩を確認できる。もし漏洩が発生している際には周囲へ漏れるのが不活性ガスであり引火燃焼の危険がなく安全である。また、燃料電池へ封入された燃料の圧力が所定圧力以上である場合には、圧力値が13が開放状態となり所定圧力まで封入圧力が低下した後、再度閉止されるので封入圧力を所定圧力に設定することができ、燃料電池の漏洩を防止できる。

【0030】図3は本発明の第3の実施例の燃料電池発電システム10の構成図であり、図1及び図2と同符号のものに相当する構成要素であり詳細な説明は省略する。図において、燃料電池7は例えば屋外に設置されており、先止め弁8と元止め弁9の各々は弁駆動部8a及び弁駆動部9aが取り付けられており、各弁駆動部は弁制御部14と接続され、さらにタイマー手段16、電池部17と接続されている。屋内には無線通信手段15からの信号を受信する表示手段18及び記憶手段19が設けられており、記憶手段19には時系列データ20が蓄積されている。21は記憶手段19の時系列データ20を演算処理する演算手段であり、22は演算手段21の結果を判定する判定手段であり、23は判定手段22の結果に基づいて報知する報知手段である。報知手段23はターミナル回路手段24を介し、公衆回線25を経てサービス会社26に接続されている。

【0031】上記構成において、先止め弁8と元止め弁9は、弁制御部14からの制御信号に基づいて弁駆動部8a及び弁駆動部9aによって弁の開閉動作を行い、発電運転を開始する前に燃料経路10に燃料ガスが封入される。圧力報知手段11で得られる検出出力は、タイマー手段16で設定された所定の時間間隔で無線通信手段15によって屋内に伝送され、通信に必要な電力は電池部17から供給される。従って、燃料電池7に燃料ガスが封入された際には検出圧力が低下し、漏洩量に応じた圧力情報が無線通信手段15から送信され、屋内などに離れた場所から日常的に漏洩発生を確認できる。また、タイマー手段16を所定の時間間隔で動作させて無線通信手段15から送信するので、送信の際に消費される電力を必要最小限に抑えることができ、電池部17を長期間隔で不要にでき、燃料電池7の発電出力の一部を蓄電させて通信用電源とする場合には、利用できる発電量を増加させることができる。屋内に伝送された検出出力は、部屋、表示手段1

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8に数値表示されるので、屋内の利用者が燃料電池7の運転を開始する前に、燃料電池7からの燃料の漏洩を確認することができる。また、運転開始前に得られる封入圧力値は記憶手段19に時系列データとして蓄積されるので、燃料電池7の老朽化によって漏洩が徐々に進行する場合にも、漏洩の経年変化の状況を的確に検知できる。また、時系列表示手段20に例えば一日毎の検知出力が数値表示されるので、屋内の利用者が発電運転の開始前に、漏洩の経年変化の状況を的確に判断することができ、また、記憶手段19に蓄積された時系列データ20は演算手段21で演算処理され、その結果は判定手段22で判定され、判定結果に基づいて報知手段23で報知されるので、利用者による個人判断を要せず、客観的に屋内の利用者に漏洩状況を認識させることができる。また、報知手段23に接続されたターミナル回路手段24は、公衆回線25を介して外部のサービス会社26に接続されているので、報知手段23からの漏洩情報をサービス会社26に即時提供でき、利用者が意識しなくても燃料電池7の保守点検を効果的に実施できる。

【0032】

【発明の効果】以上説明したように本発明の燃料電池発電システムは、以下に述べる効果をもつものである。【0033】すなわち、元止め弁及び先止め弁と、両弁が閉じた状態での封入圧力を検知し報知する圧力報知手段を備えた第1の構成により、燃料電池の下流部に設けられた先止め弁が閉じた状態では燃料が供給され、燃料電池の上流部に設けられた元止め弁が閉じた状態では燃料が供給され、燃料電池内に燃料が封入された状態となり、その封入圧力が燃料が圧力報知手段によって検知し報知される。燃料電池から燃料が漏洩している際には圧力値が徐々に低下するので、2つの閉止弁と圧力報知手段からなる簡単な構成によって漏洩を確認できシステムを小型化できる。発電運転を開始する前に漏洩を確認できるもので安全であり、もし漏洩が発生したとしても燃料経路内の燃料のみが放出されるのでごく少量であり安全である。

【0034】また元止め弁の入口側に不活性ガスを供給する不活性ガス供給源を備えた第2の構成により、燃料電池内に不活性ガスが封入され、その圧力値が圧力報知手段によって検知され圧力低下から漏洩を確認できる。もし漏洩が発生している際には周囲へ漏れるのが不活性ガスであり引火燃焼の危険がなく安全である。

【0035】また、先止め弁として所定圧力で開放される圧力弁を備えた第3の構成により、燃料電池へ封入される燃料の圧力が所定圧力以上である場合には、先止め弁が開放状態となるので、封入圧力を所定圧力に設定することができ、封入圧力が異常に高圧となった場合には燃料電池内に高圧が生じることがなく漏洩を防止できる。

【0036】また圧力報知手段で得られた圧力情報を送信する無線通信手段を備えた第4の構成により、燃料電池

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池に封入される燃料の圧力が圧力報知手段で検知され、燃料電池に漏洩が発生した際には検出圧力が低下し、漏洩量に応じて圧力情報が無線通信手段から送達される。従って信号線などの施工なしに、屋内などの離れた場所から日荷時に漏洩発生を通知できる。

【0037】また無線通信手段を所定の時間間隔で動作させるタイマー手段を備えた第5の構成により、無線通信手段から送達する際に消費される電力を必要最小限に抑えることができ、燃料電池の発電出力を著電しておいて利用する場合には利用可能な発電量を増加させることができる。

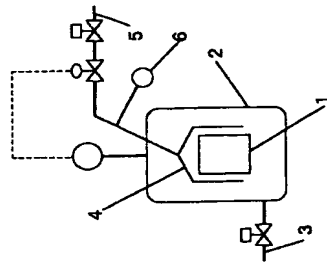
【0038】また無線通信手段によって送達された圧力情報を屋内に表示する表示手段を備えた第6の構成により、燃料電池に封入された燃料の圧力情報が無線通信手段によって屋内に表示されるので、屋内の利用者が燃料電池の運転を開始する前に漏洩燃料電池からの燃料の漏洩を確認することができ、漏洩にたいしてより安全性が向上できる。

【0039】また無線通信手段によって送達された圧力情報の時系列データを蓄積する記憶手段を備えた第7の構成により、燃料電池の老朽化によって漏洩が徐々に進行する場合にも、運転開始前に漏洩検知される封入圧力の圧力情報が記憶手段に蓄積されるので、漏洩の経年変化の状況を的確に検知できる。

【0040】また記憶手段に蓄積された圧力情報の時系列データを演算する時系列演算手段を備えた第8の構成により、屋内の利用者が発電電圧の開始前に、燃料電池からの漏洩の経年変化の状況を確認し判断することができ、

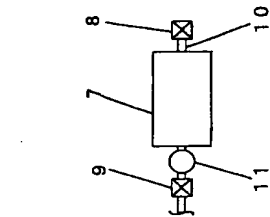
【0041】また圧力情報の時系列データを演算処理し、得られた圧力値から燃料の漏洩異常を判定しその結果に基づき必要時にその状態を通報する、演算手段と判定

【図4】



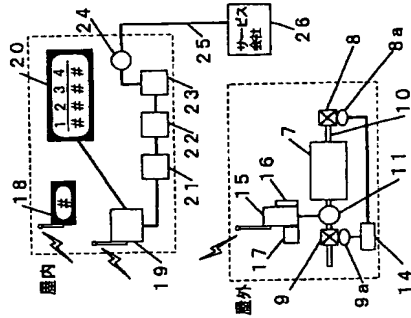
【図1】

- 7 燃料電池
- 8 先止め弁
- 9 元止め弁
- 11 圧力報知手段



【図3】

- 15 無線通信手段
- 16 タイマー手段
- 18 表示手段
- 19 記憶手段
- 20 時系列演算手段
- 24 ターミナル回路手段



【図2】

- 12 不活性ガス供給源
- 13 圧力通知弁

